Operation & Maintenance Data

OM 931-3

Group: **WSHP**

Part Number: **669479403**

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MicroTech® III Unit Controller for Water Source Heat Pump Units

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Introduction

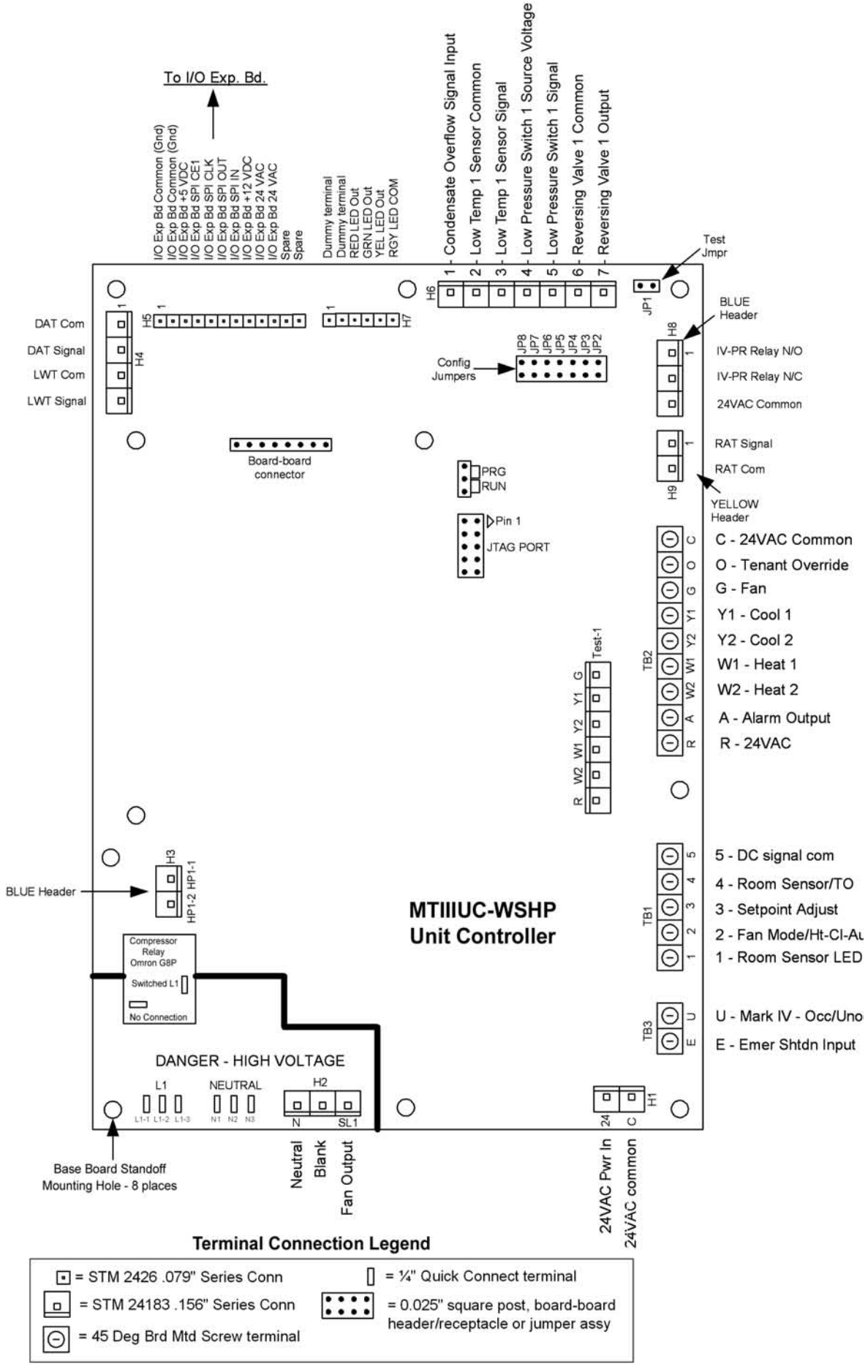
This installation and operation manual covers the Micro-Tech® III unit controller for Daikin McQuay Water Source Heat Pumps. For information on LonWorks® or BACnet® communication modules and other ancillary components, see:

- IM 927 - MicroTech III Water Source Heat Pump LonWorks Communication Module.
- IM 928 - MicroTech III Water Source Heat Pump Unit Controller BACnet MS/TP Communication Module.
- IM 933 - LonWorks Plug-In Software for use with MicroTech III Unitary Controller - LonWorks Communication Module.
- IM 952 - Multiple Unit Control Panel (MUCP) for use with MicroTech III Unit Controller and Mark IV Unit Controller.
- IM 955 - MicroTech III Water Source Heat Pump Wall-Mounted Room Temperature Sensors.
- IM 956 - Temperature Sensors for Units with MicroTech III Unit Controller and LonWorks Communication Module.

Table 1: MicroTech III Unit Controller Terminals & Descriptions

H1 - 1	24	24 VAC Power Input
H1 - 2	C	24 VAC Common
H2 - 1	SL1	Fan Output - Switched L1
H2 - 2		Blank Terminal
H2 - 3	N	Fan Neutral
H3 - 1	HP1-1	High Pressure Switch 1 Input Terminal 1
H3 -2	HP1-2	High Pressure Switch 1 Input Terminal 2
H4 - 1		Discharge Air Temp Common
H4 - 2		Discharge Air Temp Signal
H4 - 3		Leaving Water Temp Common
H4 - 4		Leaving Water Temp Signal
H5 - 1	1	I/O Expansion Board Common (Gnd)
H5 - 2		I/O Expansion Board Common (Gnd)
H5 - 3		I/O Exp Board +5 VDC
H5 - 4		I/O Expansion Board SPI CE1
H5 - 5		I/O Expansion Board SPI CLK
H5 - 6		I/O Expansion Board SPI OUT
H5 - 7		I/O Expansion Board SPI IN
H5 - 8		I/O Expansion Board +12 VDC
H5 - 9		I/O Expansion Board 24 VAC
H5 - 10		I/O Expansion Board 24 VAC
H5 - 11		Spare
H5 - 12		Spare
H6 - 1	1	Condensate Overflow Signal Input
H6 - 2		Low Temp 1 Sensor Common
H6 - 3		Low Temp 1 Sensor Signal
H6 - 4		Low Pressure Switch 1 Source Voltage
H6 - 5		Low Pressure Switch 1 Signal
H6 - 6		Reversing Valve 1 Common
H6 - 7		Reversing Valve 1 Output
H7 - 1	1	Dummy Terminal
H7 - 2		Dummy Terminal
H7 - 3		Red LED Output
H7 - 4		Green LED Output
H7 - 5		Yellow LED Output
H7 - 6		Red-Green-Yellow LED Common
H8 - 1	1	Isolation Valve/Pump Request Relay N/O
H8 - 2		Isolation Valve/Pump Request Relay N/C
H8 - 3		24 VAC Common
H9 - 1	1	Return Air Temperature Signal
H9 - 2		Return Air Temperature Common
TB1 - 1	1	Room Sensor LED Output
TB1 - 2	2	Fan Mode / Heat-Cool-Auto Input
TB1 - 3	3	Setpoint Adjust Input
TB1 - 4	4	Room Temperature Sensor / Tenant Override
TB1 - 5	5	DC Signal Common
Test-1	R	24 VAC
Test-2	W2	Heat Stage 2 Input
Test-3	W1	Heat Stage 1 Input
Test-4	Y2	Cool Stage 2 Input
Test-5	Y1	Cool Stage 1 Input
Test-6	G	Fan
TB2 - 1	R	24 VAC
TB2 - 2	A	Alarm Output
TB2 - 3	W2	Heat Stage 2 Input
TB2 - 4	W1	Heat Stage 1 Input
TB2 - 5	Y2	Cool Stage 2 Input
TB2 - 6	Y1	Cool Stage 1 Input
TB2 - 7	G	Fan Input
TB2 - 8	O	Tenant Override Input
TB2 - 9	C	24 VAC Common
TB3 - 1	E	Mark IV Emergency Shutdown Input
TB3 - 2	U	Mark IV Unoccupied/Occupied Input
L1 - 1	L1 - 1	Line Voltage Terminal 1
L1 - 2	L1 - 2	Line Voltage Terminal 2
L1 - 3	L1 - 3	Line Voltage Terminal 3
N1	N1	Neutral Terminal 1
N2	N2	Neutral Terminal 2
N3	N3	Neutral Terminal 3

Figure 1: MicroTech III Unit Controller Terminal Locations



⚠ CAUTION

The MicroTech III circuit board incorporates static sensitive devices. A static charge from touching the device can damage the electronic components. To help prevent damage during service, use static discharge wrist straps.Static discharge wrist straps are grounded to the heat pump chassis through a 1 Mohm resistor.

Replacing a MicroTech III circuit board:

1. Connect wrist strap to unit.
2. Remove faulty board and place on static protected surface.
3. Remove replacement board from static protected bag.

Do not touch circuit board; hold by edges.

4. Holding board in grounded hand, install board in unit.
5. Insert faulty board in empty static bag for return.

Initial Power-Up

Pre start check list:

A random start delay time between 180 and 240 seconds is generated at power up.

Figure 2: Location of Configuration Jumpers on the Base Board Controller

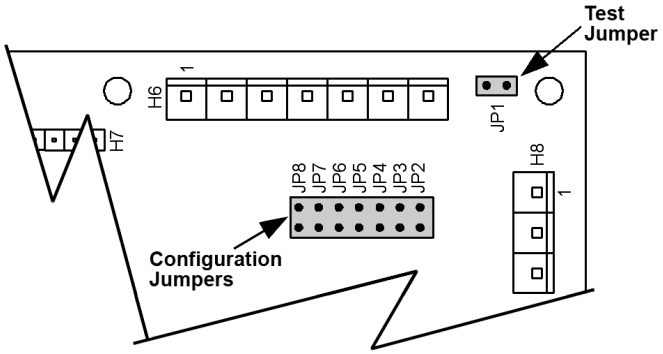


Table 2: Configuration Jumper Settings

Jumper	Description	Options
JP1	Mode	Open for normal operation mode
		Shorted for service/test operation mode
JP2	Fan operation only applies to network controls	Open for continuous fan operation
		Shorted for cycling fan operation
JP3	Freeze protection	Open for water freeze protection
		Shorted for antifreeze protection
JP4	Future spare	Future spare
JP5	Set point adjustment range only applies to network controls with a room temperature sensor	Open for adjustment range of -3.0° to +3.0° F
		Shorted for 50° to 90° F adjustment range
JP6	Room control type	Open for thermostatic room control
		Shorted for room temperature sensor control, MicroTech III only
JP7	Future spare	Future spare
JP8	Future spare	Future spare

General Use and Information

The MicroTech III unit controller is provided with two drive terminals, R (24VAC), and C (0VAC) that can be used to drive the thermostat inputs (G, Y1, Y2, W1, and W2) and control inputs (U, E and O). Any combination of or single board drive terminal (R, or C) may be used to operate the MicroTech III's unit controller or thermostat inputs. Some of the control inputs are used within the Water Source Heat Pump and not accessible to the end user without a field service tool (laptop with appropriate software).

Typically the MicroTech III unit controller's R (24VAC) terminal is used to drive the board's thermostat inputs and control inputs by connecting it to the R terminal of an industry standard thermostat. The control outputs of the standard thermostat are then connected to the MicroTech III unit controller's thermostat inputs and control inputs as needed. Any remaining board input(s) may be operated by additional thermostat outputs or remote relays (dry contacts only).

All MicroTech III unit controller inputs must be operated by dry contacts powered by the control board's power terminals. No solid state devices (Triacs) may be used to operate MicroTech III unit controller inputs. No outside power sources may be used to operate MicroTech III. All units must be properly grounded per local code requirements. See the Installation and Maintenance bulletin specific to your Water Source Heat Pump.

Occupied Operation

Board LED Status – Occupied		
Yellow	Green	Red
Off	On	Off

The board will be in occupied mode if the unoccupied terminal (U) is de-energized.

Thermostat Inputs (G, Y1, Y2, W1 and W2)

Thermostat inputs used during occupied operation are G, Y1, and W1, which when energized will activate the Fan Only, Cooling Mode, and Heating Mode respectively. Input W2 and Y2 work the same as W1 and Y2 respectively for single circuit units in occupied mode. For information on W2 and Y2 for dual circuit units, refer to "Dual Circuit Units" on page 17.

The MicroTech III unit controller is configured so that when either the Y1 or W1 input is energized the unit fan is also activated with Cooling or Heating Modes. In other words, energizing Y1 and G together will have the same effect as energizing just Y1. The W1 input has priority over the Y1 input. In situations when both inputs W1 and Y1 become energized (unlikely) in any order the unit will go into the Heating Mode as described below:

1. If the unit is in Cooling Mode, Y1 is energized. If W1 becomes energized and remains energized, the following will occur:
   - The compressor de-energizes.
   - The compressor restarts at 180 seconds (powerup delay timer).
   - The reversing valve output energizes within 5 to 20 seconds of the compressor being energized (Heating Mode position), depending on the configuration of jumpers JP7 and JP8.
2. If the unit is in Cooling Mode, Y1 is energized. If W1 becomes energized momentarily, the controller de-energizes the compressor for 180 seconds (shortcycle timer) and then returns to the cooling mode.
3. However, if the unit is in Heating Mode, W1 is energized. If Y1 becomes energized the unit remains in Heating Mode.
4. Y2 is the second stage cooling, and applies to dual compressor units.

Control Inputs (HP, LP, SLTS, COF, U, E, O)

The control inputs are High Pressure (HP), Low Pressure (LP), Suction Line Temperature Sensor (SLTS), Condensate Overflow (COF), Unoccupied (U), and Remote Shutdown (E). The control inputs are in normal states during occupied mode. The state of each control in occupied mode during normal operation is as follows:

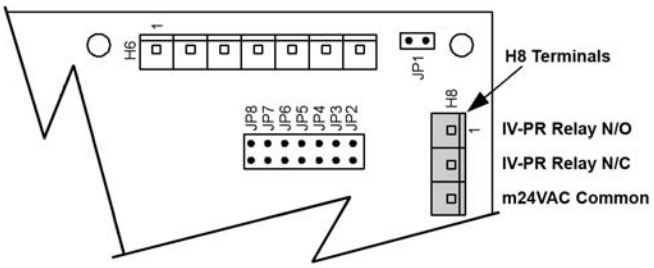
- High / Low Pressure (HP, LP): energizes, switch is closed (no fault).
- Suction Line Temperature Sensor (SLTS): temperature sensor on the suction line which provides low temperature protection. Condensate Overflow(COF):sensing no condensate water (no fault).
- Unoccupied (U): de-energized (no signal).
- Remote Shutdown (E): de-energized (no signal).
- Tenant Override (O): has no effect in occupied mode.

Control Outputs {A and IV/PR (H8)}

The control outputs are Alarm Fault (A) and Isolation Valve / Pump Request {IV/PR (H8)}. The operation of the control outputs during occupied mode is as follows:

- Alarm Fault (A): energized (no fault).
- Isolation Valve / Pump Request {IV/PR (H8)}: is selectable to be energized when the compressor is off (normally closed), or when the compressor is on (normally open), by moving the wire lead to the appropriate terminal.

Figure 3: H8 Terminals on MicroTech III Board



Fan Operation

The G terminal controls continuous fan operation. The fan runs continuously when the G terminal is energized. When the G terminal is de-energized, the fan cycles with the compressor.

Cooling Mode

The Y1 terminal controls the Cooling Mode of operation. When the Y1 terminal is energized (24VAC), the following occurs:

1. The fan energizes.
2. The IV/PR (H8) control output de-energizes or energizes depending on the H8 terminal wiring (refer to Table 1 on page 4 & Figure 1 on page 5).
3. The compressor energizes after 30 seconds.
4. If the reversing valve output is energized, the reversing valve out put will be de-energize within 5 to 20 seconds of the compressor being energized, depending on the configuration of jumpers JP7 and JP8.

When the Y1 terminal is de-energized, the following occurs:

1. The compressor de-energizes.
2. The fan de-energizes, unless the G terminal is energized (24VAC).
3. The IV/PR (H8) control output energizes or deenergizes depending on the H8 terminal wiring (refer to Table 1 on page 4 & Figure 1 on page 5).
4. The reversing valve output remains de-energized.

Note: To prevent compressor cycling, the required minimum on/off time default is 180 seconds. This may cause the compressor time delay to be longer than indicated above.

Heating Mode

The W1 terminal controls the occupied Heating Mode of operation. When the W1 terminal is energized, the following occurs:

1. The fan energizes
2. The IV/PR (H8) control output de-energizes or energizes depending on the H8 terminal wiring (refer to Table 1 on page 4 & Figure 1 on page 5).
3. The compressor energizes after 30 seconds.
4. If the reversing valve output is de-energized, the reversing valve output will be energize within 5 to 20 seconds of the compressor being energized, depending on the configuration of jumpers JP7 and JP8.

When the W1 terminal is de-energized, the following occurs:

1. The compressor de-energizes.

2.The fan de-energizes, unless the G terminal is energized.

3. The IV/PR (H8) control output energizes or deenergizes depending on H8 terminal wiring (refer to Table 1 on page 4 & Figure 1 on page 5).
4. The reversing valve output remains energized.

Note: *To prevent compressor cycling, the required minimum on/off time default is 180 seconds. This may cause the compressor time delay to be longer than indicated above.*

Unoccupied Operation – Stand Alone Thermostat Control

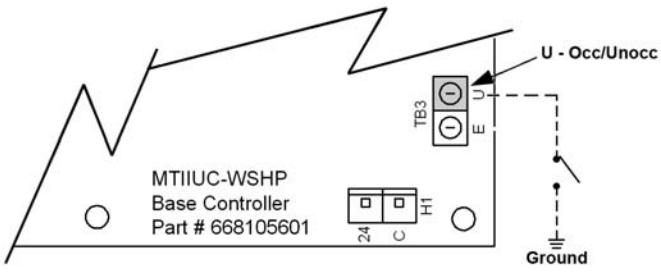
The board will be in unoccupied mode if the unoccupied terminal (U) is grounded.

Board LED Status – Unoccupied		
Yellow	Green	Red
On	On	Off

Thermostat Inputs (G, Y1, Y2, W1, and W2)

The only thermostat input used during unoccupied operation is W2, which when energized will activate Heating Mode. Inputs G, Y1, Y2 and W1 have no effect during unoccupied mode.

Figure 4: Terminal "U" - Grounded for Unoccupied



Control Inputs (HP, LP, SLTS, COF, U, E, O)

The control inputs are High Pressure (HP), Low Pressure (LP), Suction Line Temperature Sensor (SLTS), Condensate Overflow (COF), Unoccupied (U), and Remote Shutdown (E). The state of each control input during unoccupied mode during normal operation is as follows:

- High / Low Pressure (HP, LP): energizes, switch is closed (no fault).
- Suction Line Temperature Sensor (SLTS): greater than setpoint unit operates (no fault).
- Condensate Overflow (COF): sensing no condensate water (no fault).
- Unoccupied (U): energizes (signal provided).
- Remote Shutdown (E): de-energizes (no signal).
- Tenant Override (O): see "Tenant Override" on page 11.

Control Outputs {A and IV/PR (H8)}

The control outputs provided by the MicroTech III unit controller are Alarm Fault (A) and Isolation Valve / Pump Request (IV/PR (H8)). The operation of the control outputs during unoccupied mode is the same as in occupied mode (see "Occupied Operation" on page 7).

Fan Operation

The G terminal has no effect during unoccupied mode.

Cooling Mode

Cooling operation is not available during unoccupied mode.

Heating Mode

The W2 terminal controls the unoccupied Heating Mode of operation. When the W2 terminal is energized the following occurs:

1. The fan energizes.
2. The IV/PR (H8) control output energizes or deenergizes depending on H8 terminal wiring (refer to Table 1 on page 4 & Figure 1, page 5).
3. The compressor will start 30 seconds later.
4. If the reversing valve output is de-energized, the reversing valve output will energize within 5 to 20 seconds of the compressor being energized, depending on the configuration of jumpers JP7 and JP8.

When the W2 terminal is de-energized the following occurs:

1. The compressor de-energizes.
2. The IV/PR (H8) control output energizes or deenergizes depending on H8 terminal wiring (refer to Table 1 on page 4 & Figure 1, page 5).
3. The reversing valve remains energized.

Note: *To prevent compressor cycling, the required minimum on/off time default is 180 seconds. This may cause the compressor time delay to be longer than indicated above.*

Additional Operating Modes

Brownout

Board LED Status – Brownout		
Yellow	Green	Red
Off	Flash	Off

Brownout condition is provided to protect the water source heat pump's motor electrical damage due to low voltage conditions.

The MicroTech III unit controller is designed to monitor the 24VAC power supply to the board. If the line voltage supplied to the water source heat pump drops, the 24VAC supply to the control board will also drop. When the line voltage supplied to the unit drops below approximately 80% of the unit nameplate rated value, the controller goes into brownout condition. The controller remains in brownout condition until line voltage returns to approximately 90% of the unit nameplate value.

When in brownout condition, thermostat and control inputs have no affect upon unit operation. No faults or modes have higher priority than a brownout fault condition. Remote shutdown and brownout conditions have the same level of priority. See "Priority of Faults and Modes" on page 12 and Table 3 on page 12.

When the unit is in brownout condition the following occurs:

1. The compressor de-energizes.
2. The reversing valve de-energizes.
3. The fan de-energizes.
4. Fault terminal (A) de-energizes (fault). A to C will be used to indicate an alarm signal.

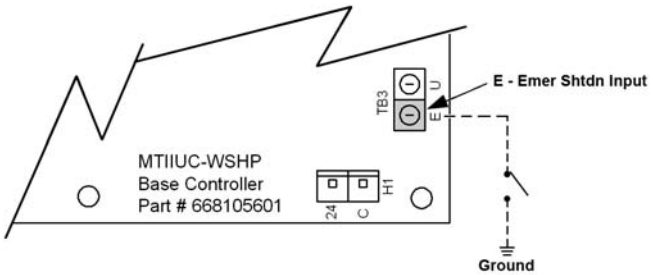
When the line voltage supplied to the unit returns to acceptable levels (~90% of nameplate) the controller returns to the current mode.

Remote Shutdown

Board LED Status – Remote Shutdown		
Yellow	Green	Red
Flash	Off	Off

When the E terminal is grounded, the MicroTech III unit controller enters remote shutdown mode. Remote shutdown is provided so that when properly connected to a building automation system, remote switch, etc., the E terminal can be used to shut down the water source heat pump.

Figure 5: Terminal "E" - Grounded for Remote Shutdown



When in remote shutdown (E terminal grounded), thermostat and control inputs have no affect upon unit operation. No faults or modes have higher priority than remote shutdown. Remote shutdown and brownout condition have the same level of priority. See "Priority of Faults and Modes" on page 12 and Table 3 on page 12.

When the unit is in remote shutdown mode, the following occurs:

1. The compressor de-energizes.
2. The reversing valve de-energizes.
3. The fan de-energizes.
4. Fault terminal (A) de-energizes (fault). A to C will be used to indicate an alarm signal.

When the E terminal is no longer grounded the unit will automatically return to normal operation.

Note: *The remote shutdown input (E) will suspend unit operation. Disconnect power when servicing the unit/ controller.*

High / Low Pressure Faults (HP/LP)

Normally closed high and low refrigerant pressure switches help protect the water source heat pump from excessively high or low refrigerant pressures. The MicroTech III unit controller monitors these switches individually. If the compressor is running and the HP circuit is open, the controller enters a pressure fault mode. If the compressor is running and the LP circuit is open after a time delay (default of 30 seconds, adjustable if a communication module is present) the controller enters a low pressure fault mode. The fan operates normally during a pressure fault condition.

Board LED Status – High/Low Pressure Faults			
	Yellow	Green	Red
HP	Off	Off	Flash
LP	Off	Off	Solid

Only brownout and remote shutdown modes have higher priority than the pressure fault mode. See "Priority of Faults and Modes" on page 12 and Table 3 on page 12.

When the unit is in high pressure fault mode the following occurs:

1. The compressor de-energizes.
2. The fault terminal (A) de-energizes (fault). A to C will be used to indicate an alarm signal.
3. After the shutdown is complete the IV/PR(H8) output will change state. (On to Off / Off to On).

High Pressure Reset

After the HP circuit is closed, the unit does not return to normal operation until the control board is reset. The unit is locked out in this manner until the unit can be serviced.

The control board is reset by a short interruption of unit power, by holding down the tenant override button for more than 10 seconds, or via the Building Automation System (BAS).

Low Pressure Reset

The low pressure switch fault is subject to intelligent reset. If the pressure recovers, it resets three times within a 24-hour time period. If further faults are detected within the 24 hours, the controller must be manually reset as described in the High Pressure Reset section above.

Low Suction Line Temperature Fault

Board LED Status – Low Suction Line Temperature Fault		
Yellow	Green	Red
Flash	Off	Off

Heating Mode

When the suction line temperature falls below 28°F on standard equipment (6.5°F on Geothermal) the low temperature fault generates the following:

- The reversing valve de-energizes. The compressor and fan continue to operate in cooling mode for 60 seconds, which results in a defrost mode. This defrosts any ice that may have accumulated in the water-to-refrigerant coil, because of a lack of condenser water flow in heat mode.
- In heat mode the low temperature fault is subject to Intelligent Reset.
- The fault terminal A de-energizes while the unit is in defrost mode. It will stay de-energized until the temperature recovers to 38°F for standard equipment (18°F for geothermal). A to C will be used to indicate an alarm signal.

Cooling Mode

When the suction line temperature falls below 28°F standard equipment (6.5°F geothermal) in cool mode the:

- Compressor de-energizes.
- The fan continues to run for 60 seconds.
- Alarm output de-energizes.
- When the suction line temperature recovers to 38°F standard equipment (18°F on geothermal) the low temperature fault continues and the unit will be locked out.

Fan Only Mode

When the suction line temperature falls below 28°F standard equipment (6.5°F geothermal) in cool mode the:

- Fan de-energizes.
- Alarm output de-energizes.
- In Fan Only mode, the low temperature fault is subject to Intelligent Reset.

Condensate Overflow

Board LED Status – Condensate Overflow		
Yellow	Green	Red
On	Off	Off

The MicroTech III unit controller's condensate sensor is designed to detect excessively high condensate water levels in the drain pan. When high condensate water levels are detected during cooling mode, the controller enters into condensate fault mode. The fan operates normally during the condensate overflow fault mode.

Some faults and modes have higher priority than condensate overflow mode. See "Priority of Faults and Modes" on page 12 and Table 3 on page 12.

When the unit senses a condensate overflow fault while in cooling mode the following occurs:

1. The compressor de-energizes.
2. The fault terminal (A) de-energizes (fault). A to C will be used to indicate an alarm signal.

When condensate levels return to normal, the controller will automatically return to normal operation.

Remote Reset of Automatic Lockouts

The Remote Reset feature provides the means to remotely reset some lockouts generated by high-pressure and/or low-temperature faults. When the MicroTech III unit controller is locked out due to one of these faults, and the cause of the fault condition has been cleared, energizing the O-terminal for 10 seconds or more forces the MicroTech III unit controller to clear the lockout. Cycling unit power also clears a lockout if the conditions causing the fault have been alleviated.

Intelligent Reset (See Table 2)

The Intelligent Reset feature helps to minimize nuisance trips of automatic lockouts caused by low-temperature faults. This feature clears faults the first two times they occur within a 24-hour period and triggers an automatic lockout on the 3rd fault. The retry count is reset to zero every 24 hours.

Tenant Override

Note: *It is recommended that the "Occupied Operation" and "Unoccupied Operation – Stand Alone Thermostat Control" sections be reviewed prior to this section.*

The MicroTech III unit controller enters tenant override mode when the O terminal is energized for 3 seconds during a period when the Water Source Heat Pump is in unoccupied mode.

Tenant override allows a tenant, returning to the controlled space after the unit has been placed in unoccupied mode, to activate the tenant override input (O) and place the unit into occupied mode.

Any remote button or switch with momentary dry contacts can be used for this purpose. During the 2-hour tenant override period the W2 input will be ignored and the G, Y1, and W1 inputs will be used (see "Occupied Operation" on page 7) for unit operation. If the U terminal is still grounded after the 2-hour time limit, the unit will return to unoccupied mode. Refer to "Unoccupied Operation – Stand Alone Thermostat Control" on page 8.

Table 2: Faults

● = Applies – = Does not apply

Fault		Auto Recovery	Remote Reset (Tenant Override)	Reset (Network Command or Power)
Invalid Configuration Jumper Setting		–	–	●
Brownout		●	–	●
HP1		●	●	●
LP1		●*	●	●
LT1 (In Heating)		●*	●	●
LT1 (In Cooling)		–	●	●
Sensor Failure	Room Temperature, LT1, LT2,	–	–	●
	EWT (w/Boilerless EH Only)	–	–	●
Condensate Overflow		●	–	●
EEPROM Failure		–	–	–

** Auto Recover for the first two occurrences, lockout on the third occurrence within 24 hours, i.e., subject to "Intelligent Reset."*

Fan Operation during most Modes, Faults and Shutdowns

The MicroTech III unit controller allows fan operation during most modes, faults and shutdowns to facilitate maximum space comfort and control. However, the fan does not operate during brownout condition. During most modes, faults, or shutdowns the fan will operate under the following conditions:

1. In occupied modes, the thermostat inputs G, Y1, or W1 are energized.
2. In unoccupied modes, the thermostat input W2 is energized.

Operation with the High Speed Jumper

- The MicroTech III unit controller includes a high-speed jumper terminal labeled JP1 to speed system check out and trouble-shooting. See Figure 2 on page 6 for JP1 location.

Note: *This jumper is intended for Daikin McQuay factory unit testing and should only be used by trained service technicians as several timing functions are reduced to speed system check out.*

- Disconnect power to the unit when installing or removing the high-speed jumper.
- The high speed jumper should only be used for a short period of time for testing of the unit's operation by a trained service technician. The jumper must be removed for normal unit operation.
- If the jumper is left on after system check out, the unit may be damaged.

Priority of Faults and Modes

The MicroTech III unit controller is configured with mode and fault priorities. Table 3 illustrates that the lower the priority level number, the higher the priority of the fault or mode. There are some exceptions to this priority list. For example, tenant override has no affect on occupied modes.

Table 3: Priority Level of Faults and Modes

Priority Level	Mode or Fault
1	Emergency Shutdown Mode
2	Brownout
3	High Pressure
4	Low Pressure
5	Low Temperature
6	Tenant Override Mode
7	Unoccupied Heating Mode
8	Occupied Heating Mode
9	Condensate Overflow
10	Occupied Cooling Mode

Table 4: MicroTech III Unit Controller Status LED's

Mode / Fault	Status LED's			Thermostat Alarm Light Output-Terminal "A"
	Yellow	Green	Red	
Occupied, Bypass, Standby, or Tenant Override	Off	On	Off	Energized
Unoccupied	On	On	Off	Energized
Condensate Overflow	On	Off	Off	De-energized
High Pressure 1 Fault	Off	Off	Flash	De-energized
Low Pressure 1 Fault	Off	Off	On	De-energized
Low Temperature 1 Fault	Flash	Off	Off	De-energized
Brownout	Off	Flash	Off	De-energized
Emergency Shutdown	Off	Flash	Off	De-energized
Room/Return Air or Low Temp Sensor 1 Failure	Flash	Flash	On	De-energized
Service Test Mode Enabled [1]	On	On	Off	De-energized
Serial EEPROM Corrupted	On	On	On	De-energized
Network "Offline" Received	Off	Off	Off	De-energized

[1] Compressor relay/compressor terminal is labeled COMP, switched line of the same electric input as any of the L1 terminals.

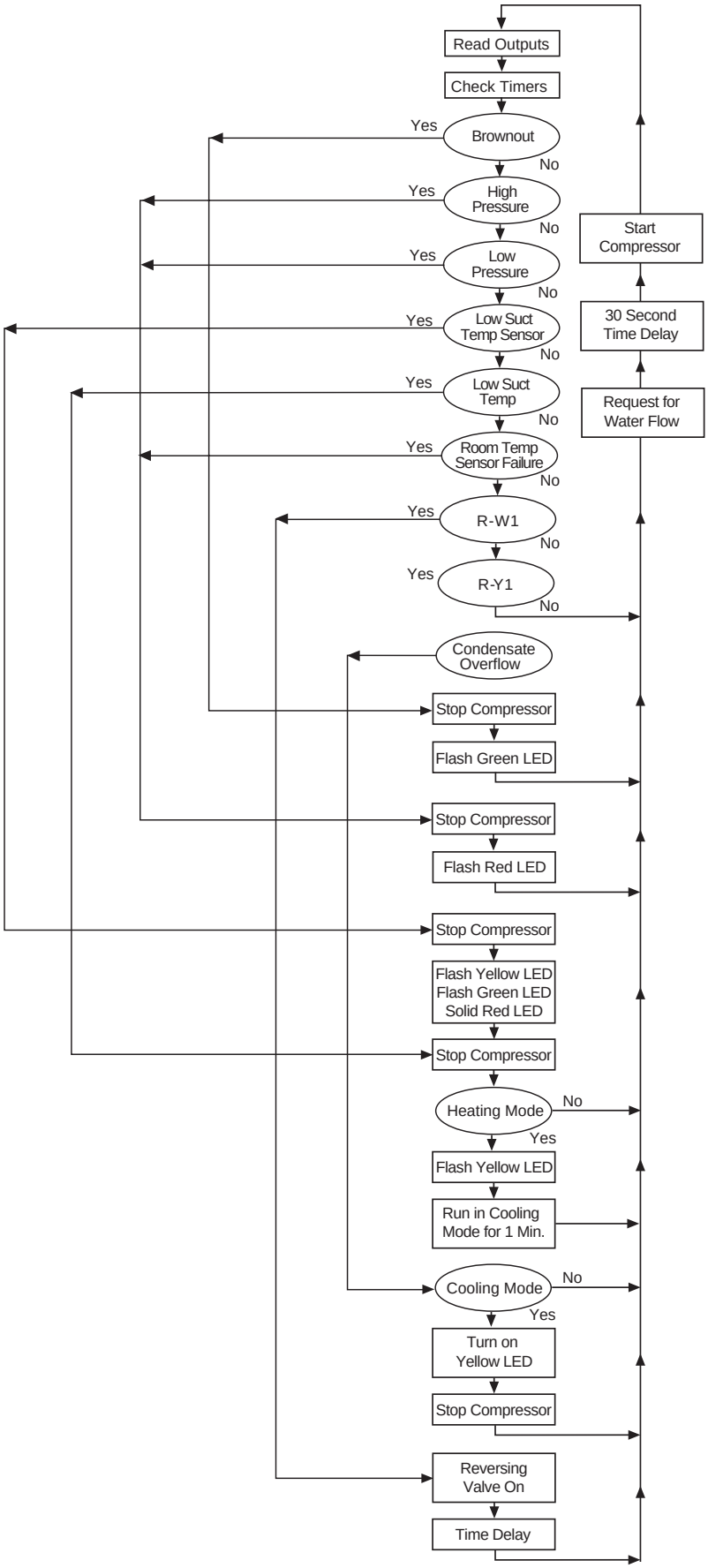
Troubleshooting the MicroTech III Unit Controller

⚠ DANGER

To avoid electrical shock, personal injury or death, be sure that field wiring complies with local and national fire, safety, and electrical codes, and voltage to the system is within the limits shown in the job-specific drawings and unit electrical data plate(s).

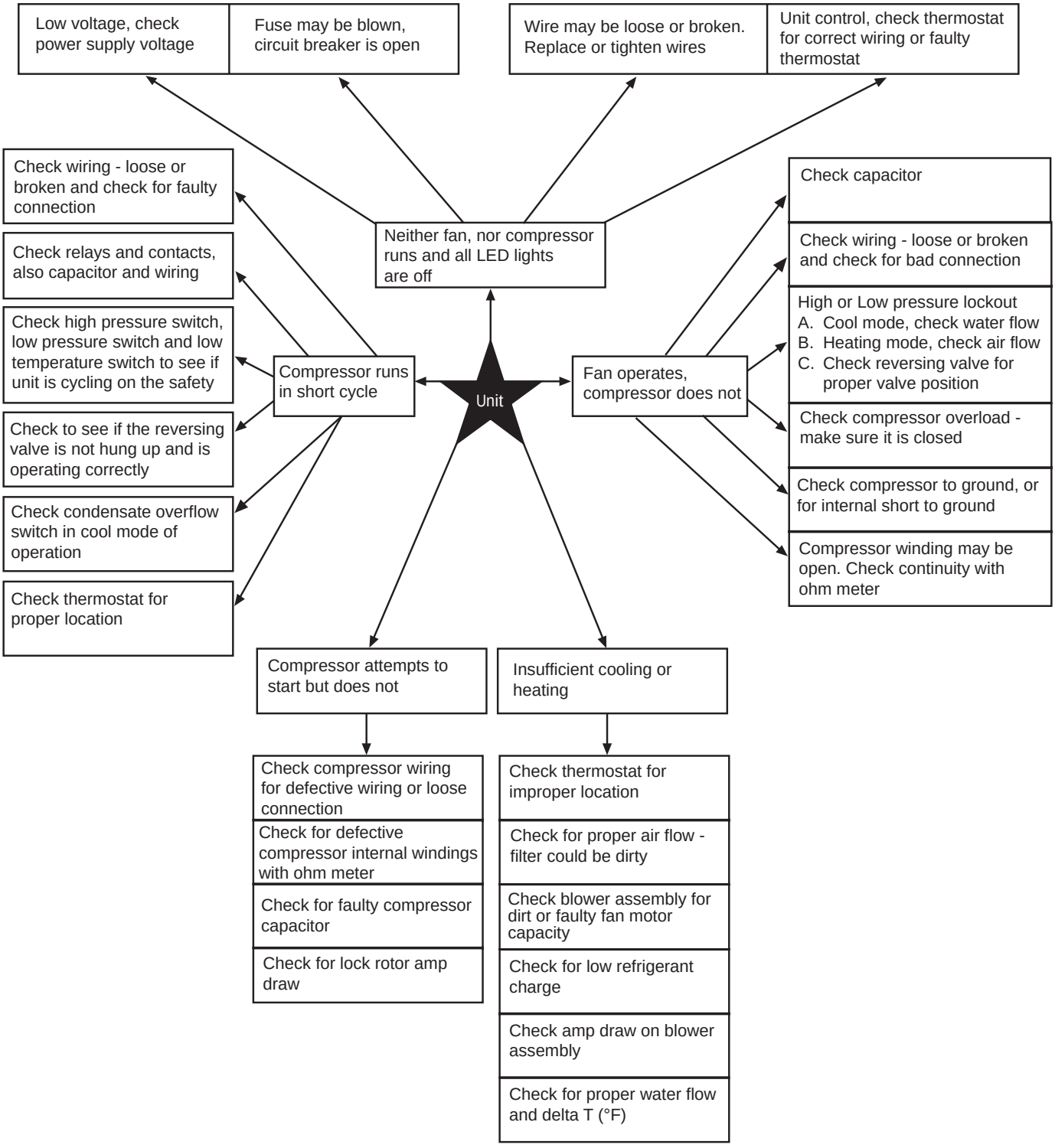
Power supply to unit must be disconnected when making field connections. To avoid electrical shock, personal injury or death, be sure to rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

Figure 6: MicroTech III Unit Controller LED Status and Faults Troubleshooting Reference



Troubleshooting the Water Source Heat Pump Unit

Figure 7: Troubleshooting Guide - Unit Operation


Low voltage, check power supply voltage
Fuse may be blown, circuit breaker is open
Wire may be loose or broken. Replace or tighten wires
Unit control, check thermostat for correct wiring or faulty thermostat
Check wiring - loose or broken and check for faulty connection
Check relays and contacts, also capacitor and wiring
Check high pressure switch, low pressure switch and low temperature switch to see if unit is cycling on the safety
Check to see if the reversing valve is not hung up and is operating correctly
Check condensate overflow switch in cool mode of operation
Check thermostat for proper location
Neither fan, nor compressor runs and all LED lights are off
Compressor runs in short cycle
Unit
Fan operates, compressor does not
Check capacitor
Check wiring - loose or broken and check for bad connection
High or Low pressure lockout
A. Cool mode, check water flow
B. Heating mode, check air flow
C. Check reversing valve for proper valve position
Check compressor overload - make sure it is closed
Check compressor to ground, or for internal short to ground
Compressor winding may be open. Check continuity with ohm meter
Compressor attempts to start but does not
Insufficient cooling or heating
Check compressor wiring for defective wiring or loose connection
Check for defective compressor internal windings with ohm meter
Check for faulty compressor capacitor
Check for lock rotor amp draw
Check thermostat for improper location
Check for proper air flow - filter could be dirty
Check blower assembly for dirt or faulty fan motor capacity
Check for low refrigerant charge
Check amp draw on blower assembly
Check for proper water flow and delta T (°F)

Microtech® III Unit Controller Interface to External Equipment

- The MicroTech III unit controller's thermostat input terminals may be directly interfaced with any standard or night setback thermostat that uses mechanical dry contacts. Power cannot be supplied from the water source heat pump for electronic thermostats that require a separate power supply for their internal operation except hose provided by Daikin McQuay. Only thermostats offered by Daikin McQuay are proven to operate properly with the MicroTech III unit controller. Daikin McQuay makes no guarantees about any other thermostat or control device interfaced by the end user with the MicroTech III unit controller.
- Care must be used to isolate all external power sources from the MicroTech III unit controller to prevent ground loops and other unpredictable electrical problems. Only dry mechanical contacts should be used to operate or interface with the MicroTech III unit controller's thermostat and or control inputs. Use mechanical relays to isolate two power systems when external equipment with its own power supply is used to interface with or control the MicroTech III unit controller's thermostat and or control inputs. For example, if you have a Building Automation System (BAS), controller, etc., and you wish to use a digital output from the building automation system or controller that is internally powered, then you must use an additional mechanical relay (not supplied by Daikin McQuay) to isolate the MicroTech III unit controller.
- Due to the nature of triacs and other solid state devices, triacs cannot be directly used to operate the MicroTech III's unit controller's thermostat or control inputs. To interface triacs or other solid state switching devices to the MicroTech III unit controller inputs, separate them from the board using mechanical relays. To do this, use the triac or solid state device to drive a mechanical relay (not supplied by Daikin McQuay), then use the mechanical relay's dry contacts to drive the desired MicroTech III unit controller input.
- The MicroTech III unit controller's valve or pump request terminal {IV/PR (H8)} is an output signal to external devices to allow water flow as required by the heat pump. The IV/PR (H8) terminal follows compressor operation inversely if connected to the normally open terminal and simultaneously when connected to the normally closed terminal. The IV/PR (H8) terminal can be used as a signal to an external pump or valve to enable flow to the unit. The compressor start is delayed for 30 seconds after the IV/PR (H8) output is energized.

Table 5: IV/PR(H8) Terminal and Compressor Operation

IV/PR(H8)	Compressor On	Compressor Off
Normally Open	24 VAC	0 VAC
Normally Closed	0 VAC	24 VAC

Appendix A

Operation and Maintenance of I/O Expansion Module

Introduction

The I/O Expansion Module is a field-installed option. It is an extension of the main board and provides extra functionality to the MicroTech III control system.

The I/O Expansion Module has 4 main purposes:

- The MicroTech III unit controller in combination with the I/O Expansion Module will be the standard control system for two stage Water Source Heat Pump equipment. For example: large vertical units.
- The I/O Expansion Module has outputs to control electric heat on a standard Water Source Heat Pump.
- The I/O Expansion Module has outputs for multi-speed fans on a standard Water Source Heat Pump.
- The I/O Expansion Module has an independent LED annunciator to identify operational fault conditions on second stage equipment.

Adding an I/O Expansion Module (with an interconnect cable) to the main controller allows two stage operation of the water source heat pump.

Features

Second Circuit

- High pressure switch
- Low pressure switch
- Low suction line temperature sensor
- Compressor output
- Reversing valve

Standard Heat Pumps / Single Circuit Units

- Monitors entering water temperature for boilerless electric heat control
- Outputs for medium and high speed fan controls

Initial Power up

Figure 8: I/O Expansion Board Configuration Jumper Terminals

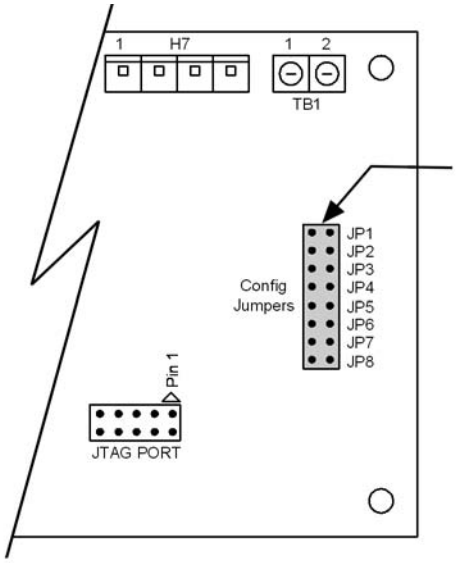


Table 6: I/O Expansion Board Configuration Jumper Settings

Jumper	Description	Options
JP1	Number of Compressors	Open for single compressor
		Shorted for dual compressor
JP2	Hot Gas/Water Reheat	Open to disable reheat
		Shorted to enable reheat
JP3 & JP4	Supplemental Heat Type	JP3 and JP4 open for no supplemental heat
		JP3 open, JP4 shorted for boilerless electric heat
		JP3 and JP4 shorted is an invalid setting
JP5 & JP6	Fan Speed Selection	JP5 and JP6 open for single-speed fan
		JP5 open, JP6 shorted for three-speed fan
		JP5 shorted and JP6 open for two-speed fan
		JP 5 and JP6 shorted is an invalid setting
JP7	Compressor Speed Type	Open for single-speed compressor
		Shorted for two-speed compressor
JP8	Future Spare	

Operation

Dual Circuit Units

- Provides standard lead / lag operation for two compressors in dual circuit units
- Circuit one will come on first when there is any call for heating or cooling at the main board
- The second circuit will be enabled after the interstage timer has expired. The interstage timer defaults to 300 seconds
- HP, LP, SLTS fault for either circuit one or circuit two, will lockout the entire unit and subject for intelligent reset

Thermostat Inputs (Y2, W2)

- The Y2 terminal which is cooling mode stage two, energizes the second compressor
- If Y1 and Y2 thermostat inputs are active at the same time, interstage timers will be used to stage the compressor up and down
- The W2 terminal which is heating mode stage two, energizes the second reversing valve followed 30 seconds later by the second compressor
- If W1 and W2 thermostat inputs are active at the same time, interstage timers will be used to stage the compressors up and down

Electric Heat Controls

Boilerless Heat Coil Control

- Turns on the factory installed heater when the entering water temperature is less than 55°F, the temperature set point is not adjustable
- For geothermal applications the factory installed electric heater turns on when the entering water temperature is less than 30°F

Note: *In both cases the compressor is shut down.*

Multiple Speed Fan Control

- When the Water Source Heat Pump is equipped with an I/O Expansion Module and factory installed electric heat, three speed fan control is possible.
- If the thermostat is calling for continuous fan operation and the compressor is not running the fan motor will run in low speed.
- If there is a call for heating or cooling (compressor is running) the fan motor will run in medium speed.
- If the electric heater is enabled the fan motor does not run in high speed.

Note: *On units with an I/O Expansion Module and no electric heat, it is possible to configure the I/O Expansion Module for a two speed fan. If there is a call for continuous fan (compressor off) the fan motor runs in low speed. If there is a call for heating or cooling (compressor on) the fan motor runs at high speed.*

Three-Speed Fan Operations

Table 7: Three-Speed Fan

	Continuous Fan	Compressor On	Electric Heat
Space Temp Satisfied	Low Speed	Off	Off
Compressor Heating/Cooling	Off	Med. Speed	Off
Electric Heat Enabled	Off	Off	High Speed

Two-Speed Fan Operations

Table 8: Two-Speed Fan

	Continuous Fan	Compressor On	Electric Heat
Space Temp Satisfied	Low Speed	Off	Off
Compressor Heating/Cooling	Off	High Speed	Off
Electric Heat Enabled	Off	Off	High Speed

Circuit Two, Additional Operating Modes

The I/O Expansion Module controls the second circuit high pressure, low pressure, and low suction line temperature operating conditions in the same manner as the main board controls the first circuit.

Table 9: I/O Expansion Module LED & Fault Outputs

Mode / Fault	Status LED's			Thermostat Alarm Light Output Terminal "A"
	Yellow	Green	Red	
Invalid Configuration Jumper Setting	Flash	Flash	Off	De-energized
Base Board Communication Fail	Off	Flash	Flash	N/A
High Pressure #2 Fault	Off	Off	Flash	De-energized
Low Pressure #2 Fault	Off	Off	On	De-energized
Low Suction Temp #2 Fault	Flash	Off	Off	De-energized
Sensor Failures Low Suction Low Suction Temp #2, [1] EWT (w/ Boilerless EH only)	Flash	Flash	On	De-energized
[2] Service Test Mode Enabled	Flash	Flash	Flash	De-energized
Unoccupied Mode	On	On	Off	Energized
Occupied, Bypass, Standby, or Tenant Override Modes	Off	On	Off	Energized

Note: *Mode / Faults are listed in order of priority.*

1 *Boilerless electric heat only*

2 *Alarm/fault LED indications take precedence over service test mode LED indication. The controller shall use service test mode if the service test mode jumper is installed, even if the LED's indicate an alarm/fault.*

Second Circuit Faults

With the addition of the second circuit the fault recovery and reset table has new faults for the second circuit (Table 10).

Table 10: Second Circuit Faults

● = Applies – = Does not apply

Fault		Auto Recovery	Remote Reset (Tenant Override)	Reset (Network Command or Power)
Invalid Configuration Jumper Setting		–	–	●
Brownout		●	–	●
HP2		–	●	●
LP1		●*	●	●
LT2 (In Heating)		●*	●	●
LT2 (In Cooling)		–	●	●
Sensor Failure	Room Temperature, LT1, LT2,	–	–	●
	EWT (w/Boilerless EH Only)	–	–	●
Condensate Overflow		●	–	●
EEPROM Failure		–	–	–

** Auto Recover for the first two occurrences, lockout on the third occurrence within 24 hours, i.e., subject to "Intelligent Reset."*

Table 11: I/O Expansion Module Connections & Descriptions

H8	Description
Pin 1	Fan high speed normally open output
Pin 2	No connection
Pin 3	24 VAC Common
H3	
Pin 1	For future development
Pin 2	
Pin 3	
Pin 4	
Pin 5	
Pin 6	
H8	
Pin 1	Dual compressor: compressor 2 normally open output, all others fan medium speed normally open
Pin 2	24 VAC common
Pin 3	No connection
Pin 4	Dual compressor: reversing valve for circuit 2, all others electric heat
Pin 5	24 VAC common
H4	
Pin 1	Entering water temperature sensor signal
Pin 2	Entering water temperature sensor common
HP6	
HP2-1	High pressure switch for circuit 2
HP2-2	High pressure switch for circuit 2
H7	
Pin 1	Suction line temperature sensor circuit 2 signal
Pin 2	Suction line temperature sensor circuit 2 common
Pin 3	Low pressure switch circuit 2 signal
Pin 4	Low pressure switch circuit 2 source
H5	LED Annunciator
TB1	For future use

Appendix B

MicroTech III Unit Controller with LonWorks® Communication Module

For installation and operation information on LonWorks Communication Module and other ancillary control components, see:

- IM 927 - MicroTech III Water Source Heat Pump LonWorks Communication Module.
- IM 933 - LonMaker Integration Plug-in Tool: For use with the MicroTech III Unit Controller.
- IM 955 - MicroTech III Wall Sensor for use with Microtech III Unit Controller

Each Daikin McQuay water source heat pump can be equipped with a LonWorks communication module that is LonMark 3.4 certified to meet the LonMark Space Comfort Control (SCC) profile for heat pumps. The controller is microprocessor-based and is designed to communicate over a LonWorks communications network. It can be factory or field-installed.

The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the Water Source Heat Pump. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the Water Source Heat Pump.

Figure 9: LonWorks Communication Module

The MicroTech III unit controller with communication module includes a unit-mounted return air, discharge air and leaving water temperature sensor. Wall mounted temperature sensors include setpoint adjustment and tenant override. The user has the capability of substituting the wall sensor with a duct-mounted return air sensor.

LONMARK 3.4

MicroTech III Unit Controller with LonWorks Communication Module orchestrates the following unit operations:

- Enable heating and cooling to maintain setpoint based on a room sensor
- Enable fan and compressor operation
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors leaving water temperature
- Relays status of all vital unit functions

The MicroTech III unit controller with communication module includes:

- Return Air Temperature sensor (RAT)(field-installed)
- Discharge Air Temperature sensor (DAT)(field-installed)
- Leaving Water Temperature sensor (LWT)

Note: *Refer to IM 956-X for details to install (RAT) & (DAT) sensors.*

⚠ CAUTION

When an optional wall-mounted room temperature sensor is connected to the unit controller, the Return Air Temperature (RAT) sensor must not be installed. A wall-mounted room temperature sensor and the return air temperature sensor must not be connected simultaneously or the unit will not operate properly.

The communication module provides access to setpoints for operational control

Available wall sensors include:

- Room sensor with LED status and tenant override button
- Room sensor with LED status, tenant override button, and ±3°F setpoint adjustment
- Room sensor with LED status, tenant override button, 55° to 90°F setpoint adjustment

MicroTech III Controller with BACnet® Communication Module

For installation and operation information on MicroTech III unit controller and other ancillary components, see:

- IM 928 - MicroTech III Water Source Heat Pump BACnet Communication Module
- IM 955 - MicroTech III Wall Sensor For use with Microtech III Unit Controller

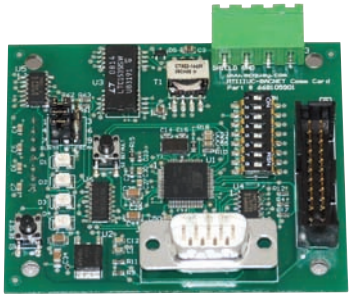
Daikin McQuay water source heat pumps are available with Daikin McQuay BACnet MS/TP communication module that is designed to communicate over a BACnet MS/TP communications network to a building automation system (BAS). It can be factory or field-installed.

The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the water source heat pump. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the water source heat pump.

The module makes operational data and commands available on a communications network using BACnet objects and properties:

- The network cable is a shielded twisted-pair cable
- Network communications run up to 76.8 Kbps
- DIP switches on the controller enable the MS/TP MAC address to be set in the range 0-127
- Four green status LEDs on the communication module indicate communication activity on the MS/TP communication network and with the unit controller

Figure 10: MicroTech III BACnet MS/TP Snap-in Communication Module



MicroTech III Unit Controller with BACnet MS/TP Communication Module orchestrates the following unit operations:

- Enable heating and cooling to maintain setpoint based on a room sensor
- Enable fan and compressor operation
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors leaving water temperature
- Relays status of all vital unit functions

The MicroTech III unit controller with communication module includes:

- Return Air Temperature sensor (RAT)(field-installed)
- Discharge Air Temperature sensor (DAT)(field-installed)
- Leaving Water Temperature sensor (LWT)

Note: *Refer to IM 956-X for details to install (RAT) & (DAT) sensors.*

⚠ CAUTION

When an optional wall-mounted room temperature sensor is connected to the unit controller, the Return Air Temperature (RAT) sensor must not be installed. A wall-mounted room temperature sensor and the return air temperature sensor must not be connected simultaneously or the unit will not operate properly.

The communication module provides access to setpoints for operational control

Available wall sensors include:

- Room sensor with LED status and tenant override button
- Room sensor with LED status, tenant override button, and ±3°F setpoint adjustment
- Room sensor with LED status, tenant override button, 55° to 90°F setpoint adjustment

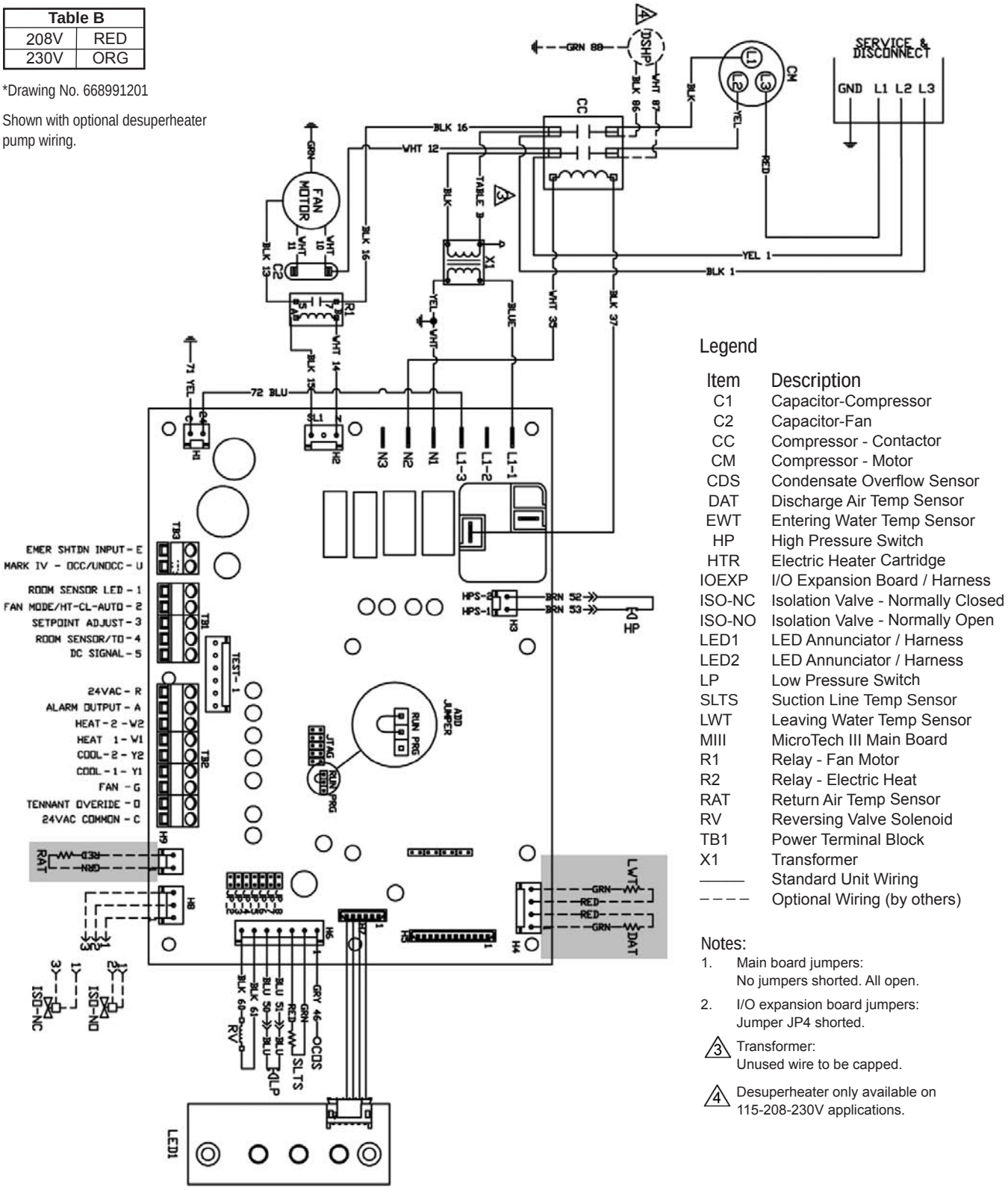
Appendix C – Typical Wiring Diagrams

MicroTech III Unit Controller (Standalone) – 208/230/460/575/60Hz/3-Phase

Table B	
208V	RED
230V	ORG

*Drawing No. 668991201

Shown with optional desuperheater pump wiring.



Legend

Item	Description
C1	Capacitor-Compressor
C2	Capacitor-Fan
CC	Compressor - Contactor
CM	Compressor - Motor
CDS	Condensate Overflow Sensor
DAT	Discharge Air Temp Sensor
EWT	Entering Water Temp Sensor
HP	High Pressure Switch
HTR	Electric Heater Cartridge
IOEXP	I/O Expansion Board / Harness
ISO-NC	Isolation Valve - Normally Closed
ISO-NO	Isolation Valve - Normally Open
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
LP	Low Pressure Switch
SLTS	Suction Line Temp Sensor
LWT	Leaving Water Temp Sensor
MIII	MicroTech III Main Board
R1	Relay - Fan Motor
R2	Relay - Electric Heat
RAT	Return Air Temp Sensor
RV	Reversing Valve Solenoid
TB1	Power Terminal Block
X1	Transformer
———	Standard Unit Wiring
– – – –	Optional Wiring (by others)

Notes:

1. Main board jumpers:
   No jumpers shorted. All open.
2. I/O expansion board jumpers:
   Jumper JP4 shorted.

△3 Transformer:
Unused wire to be capped.

△4 Desuperheater only available on 115-208-230V applications.

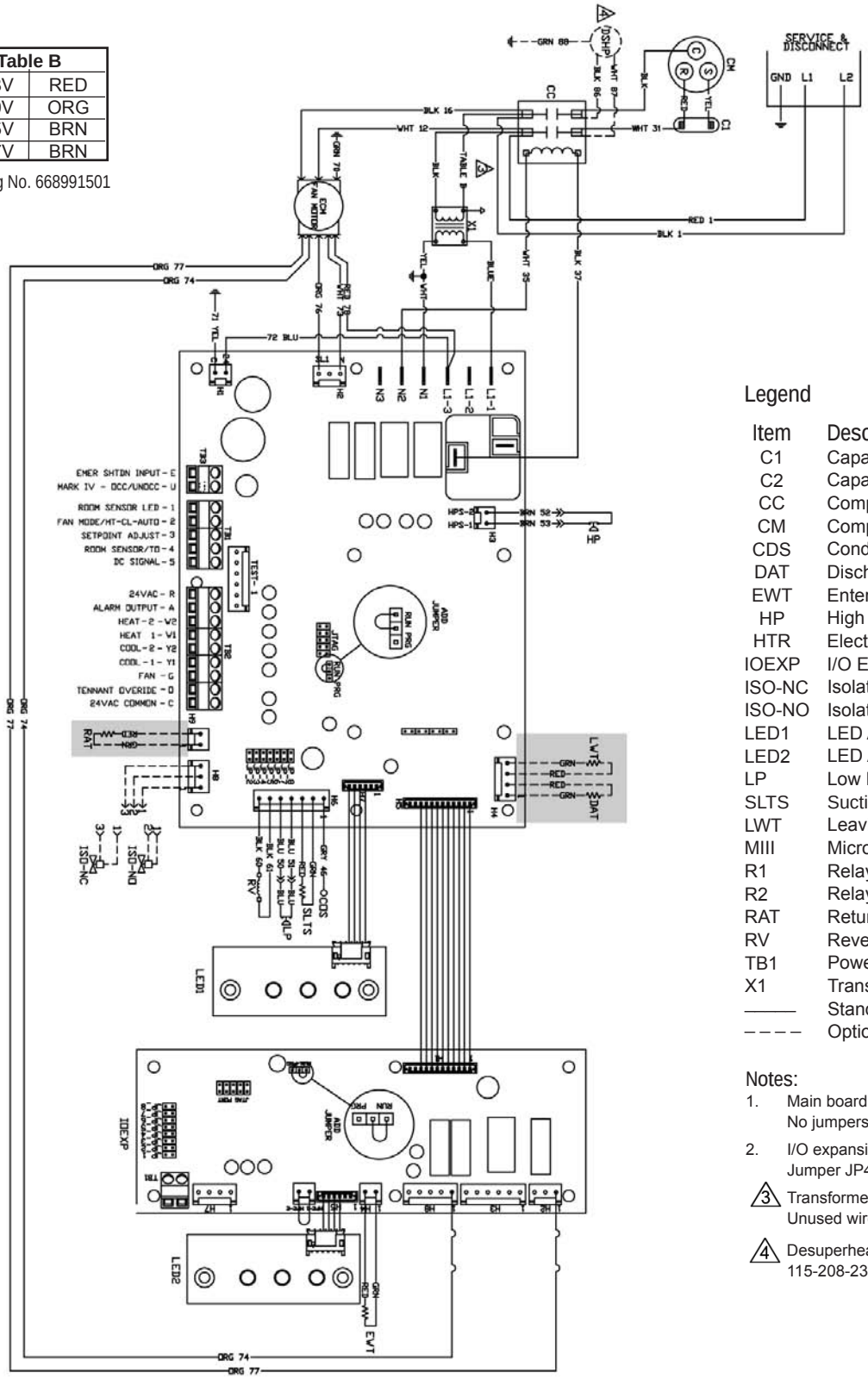
Note: *The gray tinted areas in the wiring diagram; Leaving Water (LWT), Discharge Air (DAT) and Return Air (RAT) Temperature sensors are shipped or are field installed on units configured with a communication module.*

**Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

MicroTech III Unit Controller with Optional ECM Motor, Desuperheater and I/O Expansion Module – 208/230/265/277/60 Hz/1-Phase

Table B	
208V	RED
230V	ORG
265V	BRN
277V	BRN

*Drawing No. 668991501



Legend

Item	Description
C1	Capacitor-Compressor
C2	Capacitor-Fan
CC	Compressor - Contactor
CM	Compressor - Motor
CDS	Condensate Overflow Sensor
DAT	Discharge Air Temp Sensor
EWT	Entering Water Temp Sensor
HP	High Pressure Switch
HTR	Electric Heater Cartridge
IOEXP	I/O Expansion Board / Harness
ISO-NC	Isolation Valve - Normally Closed
ISO-NO	Isolation Valve - Normally Open
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
LP	Low Pressure Switch
SLTS	Suction Line Temp Sensor
LWT	Leaving Water Temp Sensor
MIII	MicroTech III Main Board
R1	Relay - Fan Motor
R2	Relay - Electric Heat
RAT	Return Air Temp Sensor
RV	Reversing Valve Solenoid
TB1	Power Terminal Block
X1	Transformer
———	Standard Unit Wiring
– – – –	Optional Wiring (by others)

Notes:

1. Main board jumpers:
   No jumpers shorted. All open.
2. I/O expansion board jumpers:
   Jumper JP4 shorted.

3 Transformer:
Unused wire to be capped.

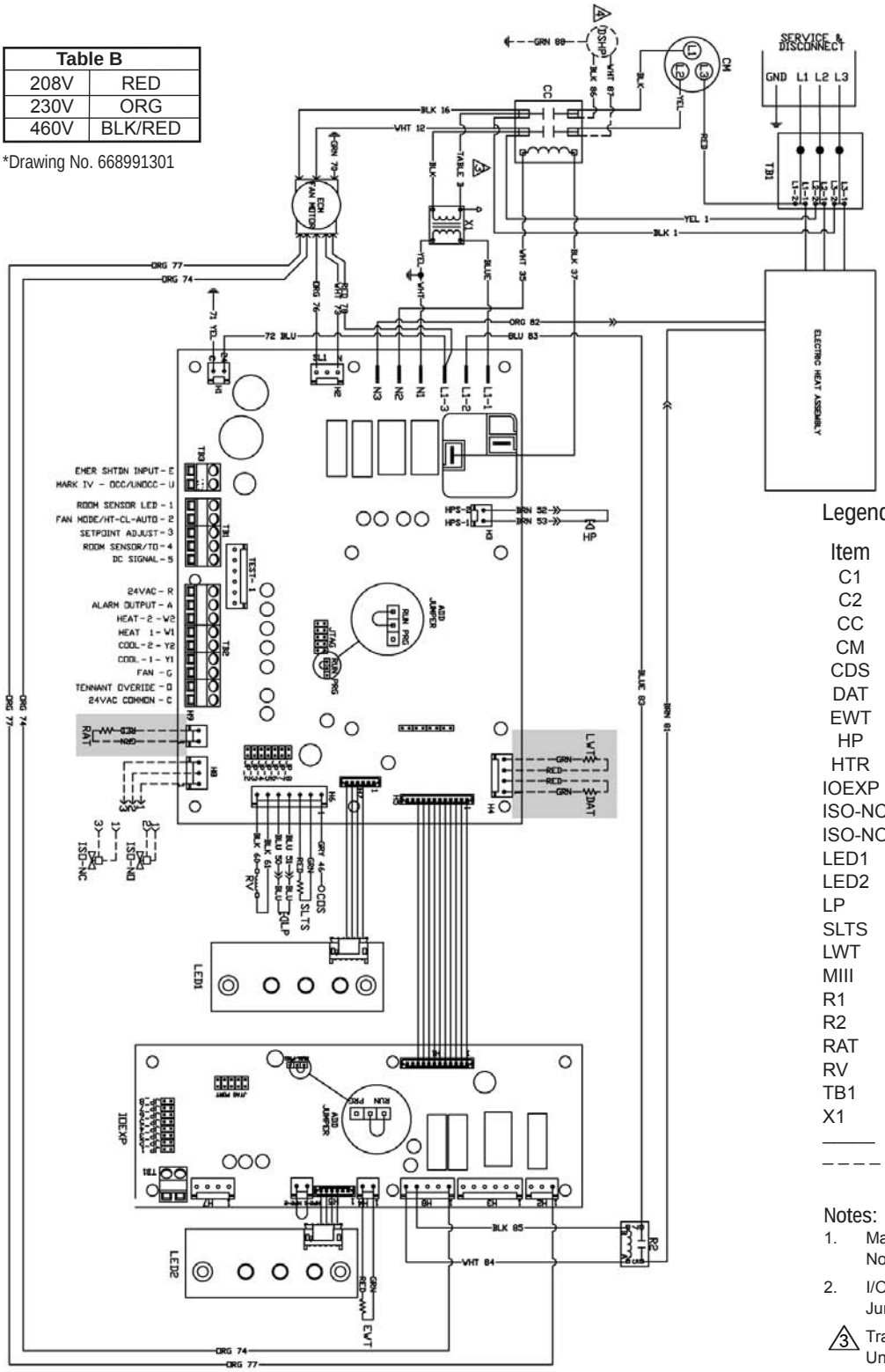
4 Desuperheater only available on 115-208-230V applications.

Note: *The gray tinted areas in the wiring diagram; Leaving Water (LWT), Discharge Air (DAT) and Return Air (RAT) Temperature sensors are shipped or are field installed on units configured with a communication module.*
**Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

MicroTech III Unit Controller with Optional ECM Motor, Desuperheater, Electric Heat Coil and I/O Expansion Module – 208/230/460/60 Hz/3-Phase

Table B	
208V	RED
230V	ORG
460V	BLK/RED

*Drawing No. 668991301



Legend

Item	Description
C1	Capacitor-Compressor
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CC	Compressor - Contactor
CM	Compressor - Motor
CDS	Condensate Overflow Sensor
DAT	Discharge Air Temp Sensor
EWT	Entering Water Temp Sensor
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HTR	Electric Heater Cartridge
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ISO-NC	Isolation Valve - Normally Closed
ISO-NO	Isolation Valve - Normally Open
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
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SLTS	Suction Line Temp Sensor
LWT	Leaving Water Temp Sensor
MIII	MicroTech III Main Board
R1	Relay - Fan Motor
R2	Relay - Electric Heat
RAT	Return Air Temp Sensor
RV	Reversing Valve Solenoid
TB1	Power Terminal Block
X1	Transformer
———	Standard Unit Wiring
– – – –	Optional Wiring (by others)

Notes:

1. Main board jumpers:
   No jumpers shorted. All open.
2. I/O expansion board jumpers:
   Jumper JP4 shorted.

△3 Transformer:
Unused wire to be capped.

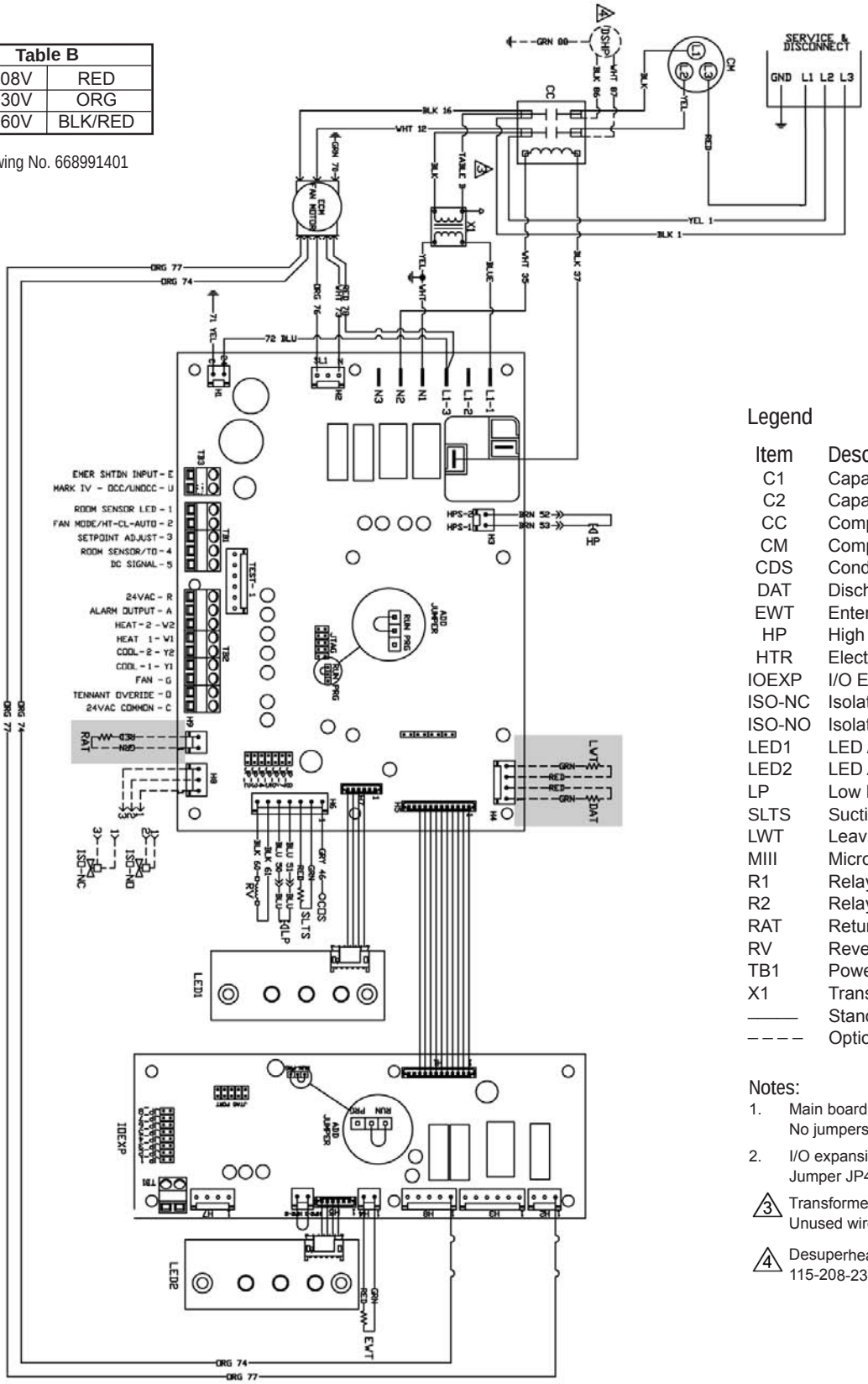
△4 Desuperheater only available on 115-208-230V applications.

Note: *The gray tinted areas in the wiring diagram; Leaving Water (LWT), Discharge Air (DAT) and Return Air (RAT) Temperature sensors are shipped or are field installed on units configured with a communication module.*
**Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

MicroTech III Unit Controller with Optional ECM Motor, Desuperheater, and I/O Expansion Module 208/230/460/60/3-Phase

Table B	
208V	RED
230V	ORG
460V	BLK/RED

*Drawing No. 668991401



Legend

Item	Description
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CDS	Condensate Overflow Sensor
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HTR	Electric Heater Cartridge
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ISO-NC	Isolation Valve - Normally Closed
ISO-NO	Isolation Valve - Normally Open
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
LP	Low Pressure Switch
SLTS	Suction Line Temp Sensor
LWT	Leaving Water Temp Sensor
MIII	MicroTech III Main Board
R1	Relay - Fan Motor
R2	Relay - Electric Heat
RAT	Return Air Temp Sensor
RV	Reversing Valve Solenoid
TB1	Power Terminal Block
X1	Transformer
———	Standard Unit Wiring
– – – –	Optional Wiring (by others)

Notes:

1. Main board jumpers:
   No jumpers shorted. All open.
2. I/O expansion board jumpers:
   Jumper JP4 shorted.

3 Transformer:
Unused wire to be capped.

4 Desuperheater only available on 115-208-230V applications.

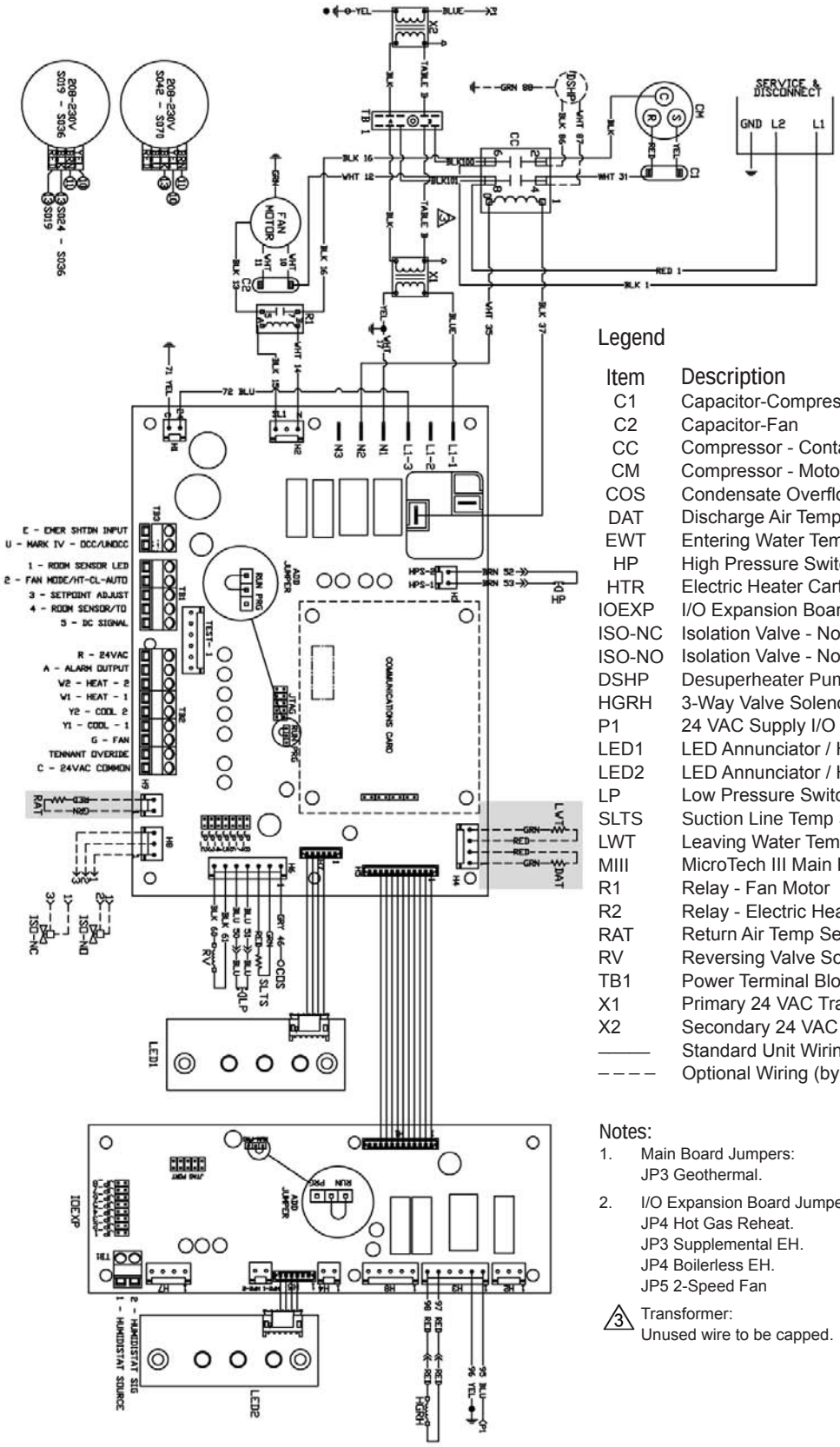
Note: *The gray tinted areas in the wiring diagram; Leaving Water (LWT), Discharge Air (DAT) and Return Air (RAT) Temperature sensors are shipped or are field installed on units configured with a communication module.*

**Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

MicroTech III Unit Controller with PSC Motor, Desuperheater and I/O Expansion Module for Hot Gas Reheat Control (Unit Sizes 019-070) 208/230/60/1-Phase

Table B	
208V	RED
230V	ORG

*Drawing No. 669007101A



Legend

Item	Description
C1	Capacitor-Compressor
C2	Capacitor-Fan
CC	Compressor - Contactor
CM	Compressor - Motor
COS	Condensate Overflow Sensor
DAT	Discharge Air Temp Sensor
EWT	Entering Water Temp Sensor
HP	High Pressure Switch
HTR	Electric Heater Cartridge
IOEXP	I/O Expansion Board / Harness
ISO-NC	Isolation Valve - Normally Closed
ISO-NO	Isolation Valve - Normally Open
DSHP	Desuperheater Pump
HGRH	3-Way Valve Solenoid
P1	24 VAC Supply I/O Expansion Brd.
LED1	LED Annunciator / Harness
LED2	LED Annunciator / Harness
LP	Low Pressure Switch
SLTS	Suction Line Temp Sensor
LWT	Leaving Water Temp Sensor
MIII	MicroTech III Main Board
R1	Relay - Fan Motor
R2	Relay - Electric Heat
RAT	Return Air Temp Sensor
RV	Reversing Valve Solenoid
TB1	Power Terminal Block
X1	Primary 24 VAC Transformer
X2	Secondary 24 VAC Transformer
———	Standard Unit Wiring
– – – –	Optional Wiring (by others)

Notes:

1. Main Board Jumpers:
   JP3 Geothermal.
2. I/O Expansion Board Jumpers:
   JP4 Hot Gas Reheat.
   JP3 Supplemental EH.
   JP4 Boilerless EH.
   JP5 2-Speed Fan

3 Transformer:
Unused wire to be capped.

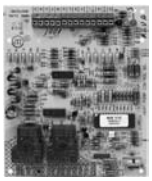
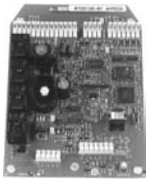
Note: *The gray tinted areas in the wiring diagram; Leaving Water (LWT), Discharge Air (DAT) and Return Air (RAT) Temperature sensors are shipped or are field installed on units configured with a communication module.*
**Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

Controller Comparison

Note: *The Mark IV, MicroTech 2000, Alerton and MicroTech III boards are NOT interchangeable.*

Table 12: Control Boards and Features

● = Applies – = Does not apply

Features	Mark IV 	MicroTech 2000 	Alerton	MicroTech III
DC Power	●	–	–	–
AC Power	●	●	●	●
Terminal Connection 1/4″ Push-on	●	–	–	–
IDC Connection	–	●	●	●
Fault Indicators	●	●	–	●
Thermostatic Controls	●	–	–	●
Room Sensor	–	●	●	●
LONmark Capable	–	●	–	●
LonWorks Capable	–	●	–	–
BACnet Capable(1)	–	–	●	●
Motorized Valve Capability	–	●	●	●
Short Cycle Protection & Random Start	●	●	●	●
Unoccupied Mode	●	●	●	●
Override Mode	●	●	●	●
Pump Restart	●	●	●	●
Loadshed	●	●	●	–
Brownout Protection	●	●	●	●
Unit Shutdown	●	●	●	●
Condensate Overflow Protection	●	●	●	●
Remote Reset(1)	●	–	–	●
Intelligent Reset(1)	–	–	–	●
Dual Circuit Capability	●	●	●	●
Adjustable Set Points Through Software	–	●	●	●
Adjustable Fan Speed	–	–	–	●
Electric Heat Availability	–	–	–	●
Service Tools Needed at Start up	–	●	●	●
Dipswitch Settings	–	–	●	–
Programmable Front-end Settings	–	●	–	●
Switching Line Voltage	●	–	–	●

Note:

(1) *Alerton BACnet requires Alerton service tools for commissioning*

(1) *Alerton dipswitch settings must be configured during commissioning*

(1) *See Remote Reset and Intelligent Reset information under section: Additional Operating Modes*

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